FOOTWEAR HAVING SENSOR SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application is a continuation of and claims priority to U.S. patent application Ser. No. 16/035,099, filed Jul. 13, 2018, which is a continuation of and claims priority to U.S. patent application Ser. No. 13/399,786, filed Feb. 17, 2012, issued as U.S. Pat. No. 10,070,680 on Sep. 11, 2018, which is a continuation-in-part of and claims priority to and the benefit of U.S. patent application Ser. No. 12/483,824, filed Jun. 12, 2009, issued as U.S. Pat. No. 8,676,541 on Mar. 18, 2014, and U.S. patent application Ser. No. 12/483,828, filed Jun. 12, 2009, issued as U.S. Pat. No. 9,462,844 on Oct. 11, 2016, both of which claim priority to and the benefit of U.S. Provisional Patent Application No. 61/061,427, filed on Jun. 13, 2008, and U.S. Provisional Patent Application No. 61/138,048, filed on Dec. 16, 2008; and application Ser. No. 13/399,786 also claims priority to U.S. Provisional Application No. 61/443,800, filed Feb. 17, 2011, and U.S. Provisional Application No. 61/443,911, filed Feb. 17, 2011; and the present application claims priority to all of such prior applications, all of which are incorporated by reference herein in their entireties.

TECHNICAL FIELD

[0002] The present invention generally relates to footwear having a sensor system and, more particularly, to a shoe having a force sensor assembly operably connected to a communication port located in the shoe.

BACKGROUND

[0003] Shoes having sensor systems incorporated therein are known. Sensor systems collect performance data wherein the data can be accessed for later use such as for analysis purposes. In certain systems, the sensor systems are complex or data can only be accessed or used with certain operating systems. Thus, uses for the collected data can be unnecessarily limited. Accordingly, while certain shoes having sensor systems provide a number of advantageous features, they nevertheless have certain limitations. The present invention seeks to overcome certain of these limitations and other drawbacks of the prior art, and to provide new features not heretofore available.

BRIEF SUMMARY

[0004] The present invention relates generally to footwear having a sensor system. Aspects of the invention relate to an article of footwear that includes an upper member and a sole structure, with a sensor system connected to the sole structure. The sensor system includes a plurality of sensors that are configured for detecting forces exerted by a user's foot on the sensor.

[0005] According to one aspect, the footwear further contains a communication port operably connected with the sensors. In one embodiment, the communication port is configured for transmitting data regarding forces detected by each sensor in a universally readable format. The port may also be configured for connection to an electronic module to allow communication between the sensors and the module.

[0006] Additional aspects of the invention relate to a port for use with an article of footwear may include a housing adapted to be at least partially received within the sole structure of the article of footwear. The housing includes a plurality of side walls defining a chamber adapted to receive an electronic module therein. An interface is engaged with the housing and has at least one electrical contact exposed to the chamber. In this configuration, the interface is adapted to form an electrical connection with the module such that the module engages the at least one electrical contact when the module is received within the chamber.

[0007] Further aspects of the invention relate to an article of footwear adapted to receive a foot and including a sole structure, an upper portion, a sensor system, and a port as described above. The sole structure includes an outsole member and a midsole member supported by the outsole member, the midsole member having a well therein. The upper portion is connected to the sole structure. The sensor system includes a force sensor connected to the sole structure and a sensor lead extending away from the force sensor, the force sensor being adapted to sense a force exerted on the sole structure by the foot. The interface of the port includes an electrical contact that is connected to the sensor lead and thereby in electronic communication with the force sensor.

[0008] Still further aspects of the invention relate to a system for use with article of footwear adapted to engage a foot. The system includes a sole structure having an outsole member and a midsole member supported by the outsole member, the midsole member having a well therein and an upper portion connected to the sole structure. The system also includes a sensor system having a plurality of force sensors connected to the sole structure and a plurality of sensor leads extending away from the force sensors, the force sensors each being adapted to sense a force exerted on the sole structure by the foot. A port is connected to the sole structure and the sensor system. The port includes a housing at least partially received within the well in the midsole member and an interface engaged with the housing. The housing includes a plurality of side walls defining a chamber and a retaining member connected to at least one of the side walls. The interface has a plurality of electrical contacts exposed to the chamber, such that the electrical contacts are connected to the plurality of sensor leads and are thereby in electronic communication with the force sensors. The system further includes an electronic module received in the chamber of the port, such that the module engages the plurality of electrical contacts of the interface when the module is received within the chamber, forming an electrical connection with the interface. The module is configured to receive signals from the force sensor through the electrical connection with the interface and store data received from the force sensor. Additionally, the retaining member of the housing exerts a force on the module to retain the module within the chamber.

[0009] Still other features and advantages of the invention will be apparent from the following specification taken in conjunction with the following drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. **1** is a side view of a shoe;

[0011] FIG. **2** is an opposed side view of the shoe of FIG. **1**;

[0012] FIG. **3** is a top view of a sole of a shoe incorporating one embodiment of a sensor system;

[0013] FIG. **4** is a side cross-sectional view of one embodiment of a shoe incorporating the sensor system of FIG. **3**;